

LUMBAR STRENGTH IN FOOTBALL PLAYERS

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PURPOSE

To evaluate the lumbar extension strength, in a young football team and in a professional first division Spanish league football team.

MATERIAL & METHODS

Of a total of 14 football players coming from two different levels, a group of young players (15-17 y.o.) and a group of professional players undergo a standardised 7 stage isometric test MEDX (MedX Corp., Ocala, FL), to evaluate their extension lumbar strength.

RESULTS

We present different relative strength (Nm/Kg) values, depending on the staged ROM, and then a comparison between the 2 groups and the sports population of our centre, is made.

CONCLUSIONS

The young football players strength level is superior compared to the other 2 groups. We work with two hypothesis: 1. The

low back pain episodes, that athletes suffer during their sport life, can be a risk factor for further strength loss; 2. The resistance training on muscle strength can be more important in the young group.

Pain as a lumbar pathology symptom is really frequent in football players. Aerial game and dribbling demand, in an important way, all lumbar structures. The adult football player, due to an overuse or an over-weight bearing, and on the other hand, the young sportster, because of a poor technique or a bad physical condition, are part of a high risk population, that can suffer low back pain. Spinal low back pain, is mainly associated with an extension muscular strength inhibition. Muscular hypotonicity leads to a loss of one of the most important stabilizing factors of the lumbar spine.

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Key words: Soccer, low back pain, strength.

futbol	0°	12°	24°	36°	48°	60°	72°	RatioF/E
Young players	4,41	4,90	5,01	5,29	5,23	5,35	5,61	1,27
Professionals	3,68	4,15	4,34	4,38	4,49	4,86	5,28	1,22
PopulationCAR	3,55	4,08	4,31	4,56	4,64	4,90	5,22	1,47

A FINITE ELEMENT MODEL FOR ANALYZING THE COMPACT BONE STRUCTURE

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A mathematical model for an osteon is proposed, taking into account the microstresses in the vicinity of the Haversian Canal and fluid flow potentials. Using the finite element method, a coupled bone-fluid problem is investigated when the bone sample is subjected to harmonic loading and the fluid pressure amplitude in the osteon is observed. A numerical analysis of the intra-osteonal potential is performed. It is found that there exists a viscoelastic behavior due to the presence of fluid which increases with the enlargement of the Haversian Canal. The results of the numerical modeling of the intra-osteonal potential are in accordance with the available experimental data.

MATERIAL & METHODS

The bone material was collected from human humerus. Seriated sections were used, using the Van Gieson and Giemsa coloring techniques were chosen (5-6 mm thickness). The obtained lamellae were analysed using a Nikon microscope and transferred as graphic files into a computer. The geometry was reconstructed using the Catia Solutions package and the coupled fluid-structure analysis was done using the ANSYS 5.6. The osteon was considered homogeneous and isotropic and a harmonic compression load was applied simulating a normal sports activities.

RESULTS

The obtained results under compression load of the model provide information on the deformation of the considered structure, the stresses distribution over the model, the strain energy and the fluid pressure amplitude. The viscoelastic behavior and shock-absorber effect due to the fluid flow was observed at the osteonal level.

bone considered an assembly solid matter- fluid is better suitable to simulate bone behavior and normal conditions. The current model needs improvements in the future based on the recent developments in the theory of porous materials that predict the anisotropic effective moduli of porous solids in terms of pores' shapes, orientations and densities.

CONCLUSIONS

The main conclusion are that the stucture of the compact

Key words: Finite Element Analysis, osteon, compact bone structure.

LOW BACK PAIN (LBP) IN A SOFTBALL TEAM. INCIDENCE OF LBP AFTER PREVENTION WITH LUMBAR STRENGTHENING

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PURPOSE

A retrospective evaluation of the incidence of LBP pain in a softball team which have been treated with specific progressive resistance exercise in the lumbar extension machine.

seems that those that train in the lumbar extension machine have low risk for it. Spinal low back pain is mainly associated with an extension muscular strength inhibition. Muscular hypotonicity leads to a loss of one of the most important stabilizing factors of the lumbar spine.

MATERIAL & METHODS

The incidence of LBP, during their first year in CAR, has been compared between two groups of female athletes, with similar ages, weight, height and training hours. Ten sportswomen representing various sports were the first one and 10 ten softball players were the other. This 2nd group has been treated with specific progressive resistance exercise in the lumbar extension machine (MedX Corp., Ocala, FL.) once a week during 6 months. The episodes of LBP as the result of direct trauma were excluded.

It's necessary to check with a prospective and randomized study, the efficiency of the prevention with the lumbar extension machine.

Key words: Softball, Low back pain, Strength, Prevention, Female.

RESULTS

We present the incidence of LBP in the 2 groups, the number of episodes, the complementary exploration that they required. A cost estimation of the prevention and treatment of LBP in each group was made.

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CONCLUSIONS

Young athletes may be at risk for the development of LBP. It

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	n	Age (y)	Height (cm)	Weight (kg)	Training hours/week	Total LBPepisodes	Total compl. Expl.	diagnostics
Softball	10	21(3,7)	164,1(6,3)	60,2(7,6)	29,9(1,9)	3	3	1FC,1D
No softball	10	20,6(3,8)	166,6(6,7)	61,3(6,1)	24,1(11,5)	11	35	2FC,2EPL,2ELT

AN UNUSUAL CASE OF TARSO-METATARSAL JOINT DISLOCATION IN A FOOTBALL PLAYER

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A 28 years old male sustained a closed injury, to the left foot while playing football. The patient was seen at the emergency department few hours after injury. No vascular or nerve injuries of the foot were noted. The foot was swollen, painful and the patient was unable to weight boar. The injury was the result of the axial load of the body weight on the midfoot while the ankle was in extreme equinus. The x-ray of the foot showed lateral displacement of the 3rd, 4th, and 5th , metatarsals. The 1rst and 2nd metatarsals were intact. This type of lateral translation of the last three metatarsals was not described in any of the commonly used classifications in literature. With the patient under general anaesthesia, closed reduction of the dislocation was attempted. A complete anatomical and stable reduction of the dislocated metatarsals

was achieved and stabilized with 2 large percutaneous K-wires. The foot was immobilized in a back splint for 2 weeks, and a complete plaster cast was then applied for another 4 weeks. Although the incidence Lisfranc's injury is increasing due to high velocity injuries, this type of injury is still considered to be uncommon and frequently misdiagnosed. Meyerson et al reported an incidence of 4% per year of tarso-metatarsal injuries in football players. In this paper we report a rare case of dislocation of 3 metatarsal shafts laterally leaving the first and the second metatarsals intact.

Key words: Tarso-metatarsal dislocation, Tarso-metatarsal fracture, dislocation, Lisfranc's joint, Lisfranc's dislocation, midfoot's, injury

THE RESULTS OF KINETIC PROGRAMME IN REHABILITATION OF KNEE INJURIES

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PURPOSE OF STUDY

The aim of this study is to observe the evolution of 10 athletes, before and after kinetic programme that we used in syndrome of postero-lateral complex of knee and lesion of sciatique externe nerve (SPE).

MATERIAL AND METHOD

We studied 10 patients, 8 female, 2 men, age 20-23 years. From alls, 4 are from football, 4 from basket, 1gymnast and 1 runner. Alls present dislocation of knee joint, without vascular lesion but lesion of SPE. We made 2 groups: Gr. 1-3pts. with lateral lig. broken and lesion of fibular head.Gr.2 with 6pts. with lesion of cross-eyed lig., and 1 with broken of SPE. In the first 15 days from accident 6 patients go to surgical consult and treatment. After 3 weeks we made a clinical and functional evaluation using muscle testing and evaluation using Lesquene scale that include: pain with score from 0-2; maxim perimeter of walking from 0-6; daily activity from 0-2.Total evaluation of this scale is: 12 points ore more means important lesion; 3 points means a good evolution; At us 3pts. have score 14; 1 score around 12; 6 have score 3 and force between 3-5.

Kinetic programme: including exercises for increase mobility, force, reeducation of walk, improve a pain. So we made exercises for quadriceps, semitendinos semimembranos,

biceps muscles, for extension of knee, stretching of hamstring and ligaments that are on the posterior face of knee.

RESULTS

After 45 days we observed that: from 3 subjects that have severes lesions, 2 have force around value 2 and 1 is irreparable; from subjects with score 12, alls go to score 5 and force 3; from 6 subjects with score 3, alls have force 5 and score 3.

After this programme, 2 subjects go to sport activity, but with limited effort; 2 subjects go to sport activity, without limited effort, but they can not make the same performance.

5 go to the same performance like before.

CONCLUSIONS

Alls exercises must to be make progressive, during 4 weeks, every day.

- evaluation using Lesquene scale is important for control the intensity of kinetic programme;

- we observe that even lesion of SPE with greph can use kinetic programme, if we use this with attention and after clinical and functional evaluation.

REHABILITATION AND COACHING AT ATHLETES-USING ELECTROSTIMULATION

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PURPOSE OF STUDY

A good muscle force and the development of this can be made using volunteers contractions (CV) or using electrostimulation (ES). For this we try to present our results in both situations, using "MIOSTIM" (apparatus for electrostimulation), for quadriceps muscle to athletes that had manies injuries to knee.

MATERIAL AND METHOD

We have three groups of sportsman with 30 subjects, from volleyball, basketball and handball. The injuries were sprain, meniscectomy, hidarthrosis postthrauma. First group with 10 subjects had been submitted for training with ES (included 5 patients with injuries); the second group with 10 subjects had been submitted to CV (included 6 patients with injuries; one group with 10 subjects was witness. We had made test six weeks, three series in one week. At group one training by ES, we increase intensity and freqv 3000 Hz. We stopped stimulation when the pain come in sight, in this moment we stimulate 5-7sec. For one stimulation we made 5 series with 5 contractions in one serie, and pause after each serie. We appreciated muscle force by scale 0-5 and muscle tonus by

myotonometric values. (60-90Uz;70-110Uz)

At second group-we used CV,5 series with 3 contractions every series. Each contraction have 5-7sec, and pause are 2sec after 2 series. Witness group didn't make training.

RESULTS

Group one, muscle force are growing with 10% for 5 subjects, with 20% for 3 subjects with more than 20% for 2 subjects. Group two at the same angles the growths of muscle force were 7% for 4 subjects, 15% for 4 subjects, 20 % for 2 subjects. Between the first and the last coaching was a difference from 5-30 percent. The efficiency was: group one 71%, group two 67%. Myotonometric value growth at group one with 3%,group two with 1%.

CONCLUSIONS

The explanation of this results is that exist a good neurophysiologic accommodation and this come in sight after short time in ES while in CV it is a biomechanic machinery and is hard to obtain. So, we can use ES and CV for performance and rehab.

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HAND-SIZE INFLUENCES OPTIMAL GRIP-SPAN IN WOMEN BUT NOT IN MEN

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This study investigates which setting (grip-span) on the standard grip dynamometer should be used when evaluating maximum grip-strength. Our first null hypothesis was: No optimal grip-span exists for measuring grip-strength. If rejected, second null hypothesis was: The optimal grip-span is unrelated to hand-size. Seventy healthy subjects (40 women/30 men, mean age 40 years, range: 20-80) and free of upper limbs lesions were evaluated. Each hand was randomly tested on 10 occasions using 5 different grip-spans. Optimal grip-spans (determinant of maximal grip-strength) were found for both male and female. Therefore, first null hypothesis was

rejected. In women, but not in men, hand-size and optimal grip-span showed a significant linear association. So, second null hypothesis was rejected for women. In conclusion, when measuring handgrip-strength in women, hand-size must be taken into consideration, we provide a mathematical equation ($y=x/5 + 1.5\text{cm}$) to adapt optimal grip-span (y) to hand-size (x). In adult men, optimal grip-span can be set at a fixed value (5.5cm).

Key words: Dynamometer, handgrip-strength, hand-size, optimal grip-span.

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A FINITE ELEMENT MODEL FOR ANALYZING THE COMPACT BONE MICROFRACTURES

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INTRODUCTION

The study of microfractures represents a very important field of research in sports medicine and biomechanics. Microcracking has been shown to occur when bone is damaged as shown by a loss of stiffness. The effect on bone's toughness of the types of damage produced at low losses of stiffness are not really known. The main factors leading to the appearance of microfractures are: violent muscle contraction, problems in the phosphocalcic metabolism etc. We try to provide in this study a microstructure-based computational model that is able to replace destructive mechanical testing of real specimens to simulate fractures, at the level of compact bone, in different sports activities, especially the endurance ones.

MATERIAL & METHODS

The bone material was collected from human humerus. The subject did not present any problems related to the bone structure. Seriated sections were used, using the Van Gieson and Giemsa coloring techniques were chosen (5-6 mm thickness). The obtained lamellae were analyzed using a Nikon microscope and transferred as graphic files into a computer. The geometry was reconstructed using the Lucia M software package. Despite the fact that the obtained geometry using this procedure is very accurate, it is not

suitable for Finite Element Method (FEM) analysis due to its sharp edges. Consequently, a smoothing process was used to obtain the so-called "idealized geometry". Due to its well-known computational capabilities, the ANSYS 5.6 FEM package was used to analyze the biomechanical behavior of the compact bone model obtained using a powerful tri-dimensional modeling software, Catia V4R2.

RESULTS

The obtained results under compression load of the model provide information on the deformation of the considered structure, the stresses distribution over the model, the strain energy, etc., as presented in the next pictures. The areas with higher stress value indicated by the computational model are similar with the zones where the longitudinal microcracks were observed in other studies.

The main conclusions are pointing to next aspects: the structure of the compact bone is able to support usual loading that appear during common activities, but in extreme conditions a longitudinal net of microcrack formation was observed; the current model needs improvements, this model represents a good start for analyzing this type of fractures.

Keywords: Finite Element Analysis, osteon, microfractures.

REHABILITATION OF THE MECHANICAL LOW BACK PAIN IN ATHLETES

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PURPOSE

Most sports injuries are musculoskeletal and require rehabilitation programme, best provided by interdisciplinary team. One of the common types of soft tissue injuries is mechanical low back pain athlete. The aim of our study was to prove the importance of complex rehabilitation of young athletes with mechanical low back pain (LBP). We used a clinical-functional evaluation (functional muscular tests were represented by Krauss-Weber tests) and LBP - Module for an unitary evaluation of our subjects.

MATERIALS AND METHODS

We studied a group of 20 young athletes (11 men, 9 females, mean age 18,5 years) with mechanical LBP (also functional nondiscal), between April and July 2001. All athletes completed the package of questionnaires (LBP Module) at

entry into the study (Time 1) after 14 days of rehabilitation (Time 2) and after complete programme (Time 3). We applied an initial kinetic complex of stretching - strengthening - co-ordination exercises for the lumbar muscular contraction), supported by thermo-electrotherapy and massage, 14 days. Then, all athletes performed the kinetic programme for another 10 days.

RESULTS

Efficiency of the initial kinetic programme was over 54, 8%. After the second period of rehabilitation, the results were superior to the first 14 day rehabilitation - the improvement of the clinical-functional parameters was over 84,5%. The mean score of LBP-Module at Time 3 was higher (29,5, SD=5,6) than mean scores at Time 1 (14,32, SD = 4,7) and Time 2 (21, 45, SD=5,8), reflecting improvement in athlete status.

CONCLUSIONS

1. Our results confirm the known aspects the importance of kinetic therapeutic modalities in the management of athletes with chronic low back pain; the interrelationships among, the various dimensions of pain and quality of sportive performance.

2. The principles of rehabilitation (the process of normalising all of the functional consequences of musculoskeletal injury) after low back musculoskeletal injury include pain and inflammation reduction, restoration of range of motion and

flexibility, therapeutic strengthening, maximisation of sport-specific agility and co-ordination, preservation of aerobic conditioning and cardiovascular fitness before return to sports.

3. The responses of muscles, tendons and ligaments to repetitive microtrauma injuries usually consist of initial inflammatory lesions and than of various conditions of degenerative changes. These soft tissue injuries have associated clinical and functional findings.

Key words: athlete, low back pain, rehabilitation.

BIOMECHANICAL STUDY OF AERODYNAMIC RESISTANCE AMONG PROFESSIONAL CYCLISTS IN WIND TUNNEL

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PURPOSE

The aim of this study was to compare the different drag forces generated by five professional cyclist pedalling in five different riding positions in order to improve their performance in competition.

METHODS

Direct measurements in a wind tunnel have been made, with the rider-bike system placed upon a calibrated force platform. The positions that subjects were asked to maintain consisted on: 1) Static position on the aerobike, 2) Pedalling on the aerobike, 3) Pedalling on the aerobike with modifications of the handlebar supports in accordance with the UCI regulations, 4) Pedalling on the aerobike without aerohelmet, 5) Pedalling on a standard racing bike. Subjects were filmed with a digital camera in order to analyse different cinematic variables such as: a) Profile height and length; b) horizontal-torso, torso-arm, arm-forearm angles; c) crank-front shaft, crank handlebar lengths. Frontal surface area was calculated drawing a grid on a frontal photo and using a scale. Using Newtons equation, $F=0.5 \times C_x \times A_f \times r \times V^2$ (where F is force in newtons, r is air density at sea level: 1.22 kg/m³, A_f is the frontal surface area and V is air velocity in m/s) C_x and F/Kg ratio was obtained. Statistical nonparametrics analysis consisted on paired t-tests (Wilcoxon) and correlations "r" (Spearman) using Statistica-

v4.0 software and a level of significance "p" less than 0.05.

RESULTS

Descriptive analysis shows mean values of 0.30 ± 0.02 m² and 0.36 ± 0.02 m² for A_f (p<0.05) in positions 1-4 and 5, respectively. The F values for position 1 (35.7 ± 1.5 N) are lower than for positions 2-5 (p<0.05); for position 2 (46.8 ± 1.8) are higher than for positions 3-5 (p<0.05); there are no differences between positions 3 and 4. Significant correlations for F and horizontal-torso angle (r=0.4 and p<0.05) and profile height (r=0.6 and p<0.01) in positions 1-4, were found. F/Kg ratio was negatively correlated with mass (r=-0.5 and p<0.05) and profile length (r=-0.7 and p<0.001). Not all cyclists used the UCI's maximal distance crank-front shaft (0.6m).

Conclusions It's important to consider that aerodynamic drag data are from dynamic positions in wind tunnel. Modifications taken will increase cyclists' performance, which couldn't be proved for the use of the aerohelmet. Increasing the crank-front shaft distance (UCI limits) will benefit the cyclists' performance mostly to those lightest.

Keywords: drag force, wind tunnel, professional cycling, performance.

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INFLUENCE OF HAND POSITION ON NEUROMUSCULAR ACTIVATION OF NECK AND ABDOMINAL MUSCLES DURING SIT-UPS

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Great care and excellent technique are required to strengthen the abdominal muscles with sit-ups. Unappropriate technique may cause neck spine stress and injuries (Stamford 1997, Warden et al. 1999). The aim of this study was to investigate if the position of the hands, which may act sustaining the head, has any influence on the neuromuscular activity at the neck and abdominal regions when performing sit-ups.

METHODS

Ten healthy young physical education students participated in the studies. Each subject performed three different sit-ups trying to keep always the trunk straight and the knees bent at 90 degrees. The position of the hands was varied in each of three kinds of sit-ups. In one type the head was held by dominant hand (NHD), in the other the head was held by both hands (NH) and during the third type of sit-up the hand were placed on the shoulders without contributing to sustain the head. The subjects performed five repetitions of each exercise at constant rate. During the exercise surface electromyography (EMG) recordings were obtained from the upper and lower regions of rectus abdominis (RA), the upper dominant trapezoid (TRAD), the non-dominant trapezoid (TRAN), the dominant (SCMD) and non-dominant sternocleidomastoid muscles (SCMN).

RESULTS

Changes in hand position had no effect of the neuromuscular activity recorded in the lower an upper segment of RA muscles. In contrasts, sit-ups performed with both hands placed on the shoulders (SH) resulted in greater average rectified EMG activity at sternocleidomastoid dominant muscle (SCMD, 73.3 ± 4.8 vs 54.7 ± 2.9 mV.s-1, $p < 0.001$) and not dominant sternocleidomastoid muscle (SCMN, 80.3 ± 5.9 vs 60.7 ± 3.0 mV.s-1, $p < 0.001$). Compared with the exercise performed without the use of the hands to support the head, the sit-ups performed with head held (NHD and NH, considered together) resulted in higher average EMG activity at the upper dominant trapezoid muscle (TRAD, 12.2 ± 0.7 vs 9.7 ± 0.7 mV.s-1, $p < 0.05$) and non-dominant upper trapezoid muscle (TRAN, 11.5 ± 0.8 vs 10.1 ± 1.1 mV.s-1). No significant effects were observed in time to reach maximal EMG activity and the value of the maximal EMG signal recorded between the three types of exercise in any of the muscles studied.

In conclusion, this study shows that the position of the hands during the performance of sit-ups has an important influence of the level of neuromuscular activation for the neck muscles but not for the rectus abdominis.

MAGNETIC RESONANCE (MR) KNEE SIGNAL CHANGES AFTER 2H RUNNING

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Long distance running uses lower extremities cushion mechanisms including knee flexion. With the onset of fatigue runners experienced changes of the joint stabilisation that should modify the movement pattern and therefore produce an stress on the tibial plateau, menisci, rotulae, and femoral condyle. MR is an effective tool to evaluate postcontusional oedema existence in both femoral condyles and tibial plateau (Sneary y col., 1996). Nowadays (Krampla y col., 2001) shows in a subjective way and with an important delay in time changes of the MR knee signal after a marathon race. The purpose of the present study is to optimise a method, which allows an objective MR feasible changes evaluation after a standardised 2h run.

5 voluntary runners, 32.0 ± 3.0 years, 178.0 ± 2.1 cm, 73.6 ± 5.5 kg, 23.1 ± 1.5 kg/m² (BMI), 19.6 ± 1.0 km/h of maximum aerobic velocity, 186 ± 2 beats/min maximum heart rate (mHR), training between 60 and 120 km weekly, participate in the

study. Before and after 2 hours run at 85% mHR (158 ± 2 beats/min), subjects were submitted to a both knee MR exam with the following characteristics: coronal tomographic STIR slices, TR 3400ms, TE 22ms, TI 150ms, 4mm of thickness, 18×18 cm of FOV and 256×224 pixels matrix acquisition. This sequence gives a fat suppressed T1-weighted image where water increases magnetic resonance signal (Gili y Capdevila, 1992). MR signal was quantified by Image-Pro Plus software at both of the femoral condyles and tibial plateau levels respectively. MR signal was evaluate in arbitrary units on the grey scale and standardised to an external reference with gadodiamide 0.02mmol/l.

Results show, after 2h run at 85% individually mHR, knee bone marrow MR changes. These changes are probably dues to vascular alterations related to an oedema, blood, hyperemia, and also trabecular microfractures. Changes are observed in both femoral condyles (20%) but not on the tibial plateau.

Despite the lower sample of subjects, experienced runners, with lower BMI, and higher distance training, shows less MR signal changes that probably reflect a better adaptation to this kind of activity. Future studies are necessary to evidenciate the joint effect of these acute changes. Development of MR

technology with tridimensional viewing allows an evaluation and quantification of the possible structural cartilage changes.

Key words: MR knee, oedema, runners

FUNCTIONAL RATIOS OF THE KNEE JOINT: IMPORTANCE OF SPECIFIC RANGE OF MOTION

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Relationships between knee joint agonist and antagonist muscles have been basically studied comparing the same contraction type (concentric or eccentric) at a given speed or conventional ratios. Recently, the relationship of agonist-antagonist strength is described by functional ratios has been suggested.

The most studied variable for comparing these ratios has been the peak torque, but angles which those take place are different in the flexor musculature regarding the extensor one, so strength is not valued in the same point of the kinetic field.

The objective of our study is to analyse the functional ratios of the flexor and extensor musculature in three athletic modalities: long jump, javelin throw and sprint, along a sports season.

MATERIAL AND METHODS

30 male's athletes (10 long jumpers, 10 javelin throwers and 10 sprinters) were examined in three moments at a season: end of general training, first moments of the competition and end of the competition. The measurement of isokinetic muscle strength was carried out using a Kin-Com dynamometer (Chattanooga Group, Inc.9 at two velocities, 60 and 300°/s.

Functional ratio representative for knee flexion was defined as the ratio of concentric hamstring strength relative to

eccentric quadriceps strength. Functional ratio for knee extension was defined as the ratio of concentric quadriceps relative to concentric hamstring strength.

Functional ratios were calculated, at each velocity, based on peak torque, total work (developed work between 5 and 85° of knee flexion), specific work 45 (developed work between 5 and 45° of knee flexion) and specific work 85 (developed work between 45 and 85° of knee flexion).

RESULTS

Significant differences were found in the total work and specific work 45 flexion ratios between sprinters and the other groups. Along the season, differences were observed fundamentally in specific 45 and total works in the extension ratios of left knee and in the flexion ratios of right knee. Furthermore, significant differences were observed respect to the evaluation speed, the values are greater at low speed than at fast one in all the studied parameters.

Conclusions: method for determining muscular balances at sports level is by means of specific functional ratios; and in the sports modalities as long jump, javelin throw and sprint, the first 40° specific ratios of the knee joint flexion, because they recognize better specific sports expressions and value better the risk of lesions.

Key words: functional ratios, isokinetic, dynamometer, knee.

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THE INCIDENCE OF TRAUMA AT A HANDBALL TEAM

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PURPOSE

It was been studied the incidence of trauma at a handball team to determine the most frequent type of trauma.

male team composed by 20 players.

The trauma was defined as any accident that made the player missed next match.

MATERIALS AND METHODS

We studied for two years the incidence of trauma at a handball

RESULTS AND CONCLUSIONS

The 20 players suffered 35 trauma on the two years.

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The frequency of trauma on one year for a player was 0,88 for minor trauma, 0,38 for moderate trauma and 0,16 for major trauma.

The distortion was the most frequent trauma. The most frequent localisation of trauma was at ankle (5) and at knee (5).

14 lesions (40%) was localised at lower limbs and 16 (45,7%) at upper limbs.

From the totality of the lesions, 6 (17,1%) was caused by over solicitation and 29 (82,8%) was caused by acute traumas.

EFFECTS OF EXTREME LONG-TERM CYCLING ON VOLUME STATUS AND RENAL FUNCTION

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PURPOSE

Strenuous long-term exercise may alter renal function mainly based by the mechanism of dehydration. From studies about long distance runners we know that due to extense fluid losses, transient hypovolemia and renal hypoperfusion can even cause acute renal failure when co-existing haemolysis and rhabdomyolysis occur. This running-induced skeletal muscle damage mainly results from the substantial amounts of eccentric loads of running. In contrast, cycling is a kind of sports known not to bring about significant skeletal muscle trauma because of its preponderant concentric strains with negligible eccentric parts. Up to our knowledge, no case of acute renal failure has been reported in cycling so far which could be due to the different kind of skeletal muscular exertion. We sought to study whether extreme long-term exercise may still alter renal function when two crucial factors are considered - when adequate fluid substitution is guaranteed and potentially aggravating skeletal muscle trauma is minor.

METHODS

We, therefore, investigated 34 male, well-trained amateur cyclists participating in the Ötztal Radmarathon 1999 - an extremely challenging one-day cycling race in the Alps of Tirol with a workload comparable to that of professional cycling (distance: 230 km; altitude difference: 5500 m). All study participants (mean age 35 years) were free of diseases and finished the ultramarathon successfully. Results: Athletes lost about 1.72 kg despite a mean fluid substitution of 5.1 L.

During the following 24 hours of rest they regained about 1 kg. The pre-race levels of haematocrit (Hct) were placed in the lower range of normal distribution. remained unchanged immediately post-exercise but significantly fell on the next day by 3% from a mean pre-race value of 0.44 to 0.41 - indicating an increase in plasma volume calculated to be 11,9%. Baseline renal functional parameters were normal before competition but rose afterwards. The increases in serum urea and uric acid were 67 and 42%. The glomerular filtration rate calculated by the formula of Cock and Goldcroft fell from a mean pre-race value of 105 to 89mL/min - representing a decrease of 15,2%. The low fractional sodium excretion, a serum urea/creatinine ratio > 40 and a fractional uric acid excretion <15% indicate prerenal azotemia. The effects observed lasted for at least 24 hours after the race despite executed rehydration. There was no evidence for coexisting exercise-induced haemolysis and the extent of skeletal muscle damage was small. All parameters investigated are illustrated as mean values (SD) in table 1.

CONCLUSIÓN

In healthy amateur athletes strenuous marathon cycling induces transient significant renal hypoperfusion and prerenal azotemia despite balanced fluid household and ongoing PV expansion. As significant dehydration and skeletal muscle damage can be excluded the aetiology of this renal functional impairment remains unclear.

Key words: marathon cycling, renal functional impairment, plasma volume expansion.

	Before race	Immediately after	One day after
Hct (40-52%)	0,44(0,02)	0,44(0,02)ns	0,41(0,02)*
%ΔPV		-1,5(6,22)ns	+11,9(9,33)
Weight loss		-1,72(1,49) τ	-0,73(0,94)n
Creatinine kinase (U/L)	79(58)	160(121)*	245(165)*
Serum-creatinine(0,7-1,4mg/L)	1,05(0,16)	1,25(0,28)*	1,19(0,17)*
Serum-urea(10-50mg/dL)	36,7(6,0)	57,0(11)*	61,2(15,2)*
Serum uric acid(2,4-7,5 mh/dL)	5,00(0,83)	7,17(1,47)*	7,11(1,40)*
Fractionalsodium excretion(%)	0,91(0,42)	0,46(0,21) τ	0,30(0,14) τ
Transtubular potassium gradient	7,0(2,0)	12,9(3,5) τ	6,4(3,2)ns
Fractional uric acid excretion(%)	5,89(2,66)	4,77(1,69) τ	3,69(1,32) τ

*p<0,001 (Wilcoxon signed-rank Test), τ p<0,001 (one sample t-test), ns= non significant

THE ROLE OF THE TANGENTIAL LAYER OF THE ARTICULAR CARTILAGE DURING THE EXPERIMENTAL INJURIES

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The tangential layer of the articular cartilage is a functional bridge between articular cavity and underlying middle layers. Its superficial cells play an important role in the matrix transport. The aim of the present investigation was to survey the changes in the fine structure of these cells appearing after experimental injuries. Intraarticular fractures of the bones making up one of the Knee joints were performed on 20 adult wistar rats. The other knee joint served as a control. The material for light, scanning and transmission electron microscopy was taken after 2 hours, 1 day, 5 days, 10 and 30 days after the trauma. In the first series (up to the 5th day) free blood could be found in the articular cavity. 24 hours after the fracture, was established activation of the fibroblasts from the

synovio-chondral junction and the cells from the tangential layer. Parts of erythrocytes were incorporated into the cells of this zone. The production of proteoglycans was increased. 5 days after the fracture most of the cells contained erythrocyte particles. They were smaller than those of the earlier group. 10 days after the trauma, in the cytoplasm of these cells, there were siderosomes-fine-grained corpuscles limited by a simple membrane. The last traces of erythrophagocytosis were observed on the 30th day. It is established in the course of our study that not only synovial cells participate in the erythrophagocytosis but the cells from tangential layer take part in it. They were little active than the synovio-chondral junction chondroblasts.

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A CASE OF AN ACUTE TRAUMATIC SPONDYLOLYTIC SPONDYLOLISTHESIS IN AN ADOLESCENT

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We present a rare case of an acute spondylolytic spondylolisthesis of L4-L5 vertebrae in a 14-year old soccer player after a major trauma. During a soccer game, the patient sustained a blow (kick) on his back by another athlete. Initially the back pain was subtle and he did not look for medical advice. Two days later, the pain became worse and bed rest combined with NSAID treatment were prescribed. Due to worsening of the symptoms and severe sciatica to both legs, an x-ray examination was conducted. First to second grade spondylolytic spondylolisthesis of L4-L5 vertebrae was diagnosed and the patient was managed non-operatively with immobilisation in an orthosis. A week later, he was unable to walk and he was admitted in our department. The MRI showed

L4-L5 disc extrusion with L4 roots pressure. A posterior reduction and L4-L5 fusion with transpedicular screws and PLIF was performed. On the second post-operative day the patient was able to walk and his symptoms were gradually alleviated. No bracing was used postoperatively.

Six months later, he was completely free of symptoms and he was allowed to return to sports. Although minor or repetitive trauma is often associated with spondylolysis, high-energy trauma may provoke a more severe form of spondylolysis with spondylolisthesis. Surgical stabilisation is mandatory since these deformities are likely to progress rapidly.

Key words: acute spondylolytic spondylolisthesis, athletes, therapy.

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